The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A plating bath for electroplating copper on a microelectronic workpiece in a through-mask plating application at a rate of at least 2 μm/min, said bath comprising:

(a) 50-85 g/L of Cu^{2+};
(b) 50-100 g/L of H_2SO_4;
(c) 30-150 ppm of Cl^-;
(d) a brightener;
(e) a wetting agent; and
(f) water.

2. The bath of Claim 1, wherein the source of Cu^{2+} is $CuSO_4 \cdot 5H_2O$.

3. The bath of Claim 1, wherein the concentration of Cu^{2+} is 60-70 g/L.

4. The bath of Claim 1, wherein the concentration of H_2SO_4 is 75-85 g/L.

5. The bath of Claim 1, wherein the source of Cl^- is HCl

6. The bath of Claim 1, wherein the concentration of Cl^- is 60-110 ppm.

7. The bath of Claim 1, wherein the concentration of brightener is 2-8 ml/L.

8. The bath of Claim 1, wherein the concentration of wetting agent is 2-10 ml/L.

9. A plating bath for electroplating copper on a microelectronic workpiece in a through-mask plating application at a rate of at least 2 μm/min, said bath comprising:

(a) 50-85 g/L of Cu^{2+};
(b) 50-100 g/L of H_2SO_4;
(c) 30-150 ppm of Cl^-;
(d) a brightener;
(e) a wetting agent;
(f) a leveler; and
(g) water.

10. The bath of Claim 9, wherein the source of Cu^{2+} is $CuSO_4 \cdot 5H_2O$.

11. The bath of Claim 9, wherein the concentration of Cu^{2+} is 60-70 g/L.

12. The bath of Claim 9, wherein the concentration of H_2SO_4 is 70-85 g/L.

13. The bath of Claim 9, wherein the source of Cl^- is HCl.

14. The bath of Claim 9, wherein the concentration of Cl^- is 60-110 ppm.

15. The bath of Claim 9, wherein the concentration of brightener is 2-8 ml/L.

16. The bath of Claim 9, wherein the concentration of wetting agent is 2-10 ml/L.

17. The bath of Claim 9 wherein the concentration of leveler is 1-6 ml/L.

18. A plating bath for electroplating copper on a microelectronic workpiece through a photoresist mask, said bath comprising:

(a) Cu^{2+};
(b) H_2SO_4;
(c) Cl^-;
(d) a brightener;
(e) a wetting agent; and
(f) water,

the bath exhibiting a droplet contact angle with the photoresist of less than 20 degrees.

19. A plating bath for electroplating copper on a microelectronic workpiece through a photoresist mask, said bath comprising:

(a) Cu^{2+};
(b) H_2SO_4;
(c) Cl^-;
(d) a brightener;
(e) a wetting agent; and
(f) water,

(g) the bath exhibiting a surface tension ranging from 45-60 dyne/cm at 20°C.

20. A process for electroplating copper on a microelectronic workpiece in a through-mask plating application at a rate of at least 2 μm/min, said process comprising:

(a) providing a plating bath comprising:

(1) 50-85 g/L of Cu^{2+};

(2) 50-100 g/L of H_2SO_4;

(3) 30-150 ppm of Cl^-;

(4) a brightener;

(5) a wetting agent; and

(6) water;

(b) providing a microelectronic workpiece having one or more through-mask openings with a conductive layer at the bottom of said opening;

(c) contacting said conductive layer with said plating bath;

(d) providing electroplating power between said conductive layer and an anode disposed in electrical contact with said bath; and

(e) depositing copper onto said conductive layer at a rate of at least 2 μm/min.

21. The process of Claim 20, wherein the current density of said electroplating power is 100-300 mA/cm^2.

22. The process of Claim 21, wherein the current density of said electroplating power is 150-220 mA/cm^2.

23. The process of Claim 20, wherein the waveform of said electroplating power is a DC and a pulse with a 10-50% duty cycle at 50-1000 Hz.

24. The process of Claim 20, wherein said workpiece is rotated at a speed of 20-200 revolutions per minute and wherein said bath flows against said workpiece at a flow rate of 1-10 gallons per minute.

25. The process of Claim 20, wherein said bath has a temperature of 25-35°C.

26. The process of Claim 20, wherein the depositing step further comprising depositing copper to form a deposited feature having a smooth surface morphology.

27. The process of Claim 20, wherein the depositing step further comprising depositing copper to form a deposited feature that has a substantially flat surface.

28. The process of Claim 20, wherein the depositing step further comprising depositing copper to form a deposited feature that has a thickness variation of less than 10%.

29. A process for electroplating copper on a microelectronic workpiece in a through-mask plating application at a rate of at least 2 μm/min, said process comprising:

(a) providing a plating bath comprising:

(1) 50-85 g/L of Cu^{2+};

(2) 50-100 g/L of H_2SO_4;

(3) 30-150 ppm of Cl^-;

(4) a brightener;

(5) a wetting agent;

(6) a leveler; and

(7) water;

(b) providing a microelectronic workpiece having one or more through-mask openings with a conductive layer at the bottom of said opening;

(c) contacting said conductive layer with said plating bath;

(d) providing electroplating power between said conductive layer and an anode disposed in electrical contact with said bath; and

(e) depositing copper onto said conductive layer at a rate of at least 2 μm/min.

30. The process of Claim 29 wherein the current density of said electroplating power is 100-300 mA/cm^2.

31. The process of Claim 30 wherein the current density of said electroplating power is 150-220 mA/cm^2.

32. The process of Claim 29 wherein the waveform of said electroplating power is a DC and a pulse with a 10-50% duty cycle at 50-1000 Hz.

33. The process of Claim 29 wherein said workpiece is rotated at a speed of 20-200 revolutions per minute and wherein said bath flows against said workpiece at a flow rate of 1-10 gallons per minute.

34. The process of Claim 29 wherein said bath has a temperature of 25-35°C.

35. The process of Claim 30, wherein the depositing step further comprising depositing copper to form a deposited feature having a smooth surface morphology.

36. The process of Claim 30, wherein the depositing step further comprising depositing copper to form a deposited feature that has a substantially flat surface.

37. The process of Claim 30, wherein the depositing step further comprising depositing copper to form a deposited feature that has a thickness variation of less than 10%.

38. A process for forming solder bumps on a microelectronic workpiece, said process comprising:

(a) providing a workpiece comprising a silicon wafer, one or more chip pads, and a passivation layer;

(b) applying over said chip pads and said passivation layer a diffusion barrier and a conductive layer;

(c) applying over said conductive layer a photoresist layer and then removing portions of said photoresist layer to create openings in said photoresist layer thereby exposing portions of said conductive layer at the bottom of said openings;

(d) providing a plating bath comprising:

(1) 50-85 g/L of Cu^{2+};

(2) 50-100 g/L of H_2SO_4;

(3) 30-150 ppm of Cl^-;

(4) a brightener;

(5) a wetting agent; and

(6) water;

(e) contacting said conductive layer with the plating bath;

(f) providing electroplating power between said conductive layer and an anode disposed in electrical contact with said bath;

(g) depositing copper onto the conductive layer at a rate of at least 2 μm/min;

(h) applying a solder layer over the deposited copper;

(i) removing said photoresist layer and thereafter etching away the exposed portions of said diffusion barrier and said conductive layer; and

(j) reflowing said solder layer.

39. The process of Claim 38 wherein said plating bath comprises:

(a) 60-70 g/L of Cu^{2+} wherein the source of Cu^{2+} is $CuSO_4 \cdot 5H_2O$;

(b) 75-85 g/L of H_2SO_4;

(c) 60-110 ppm of Cl^- wherein the source of Cl^- is HCl;

(d) 2-8 ml/L of a brightener;

(e) 2-10 ml/L of a wetting agent; and

(f) water.

40. The process of Claim 38 wherein, the plating bath further comprises a leveler.

41. A process for forming conductive feature employing through-mask plating comprising:

(a) providing a microelectronic workpiece, the microelectronic workpiece including a passivation layer;

(b) applying a barrier layer over the passivation layer;

(c) applying a conductive layer over the barrier layer;

(d) applying a masking layer over the conductive layer;

(e) patterning the masking layer to expose portions of the conductive layer;

(f) electroplating copper onto the conductive layer at a rate of at least 2 μm/min by:

(1) contacting the conductive layer with a plating bath comprising:

a) 50-85 g/L of Cu^{2+};

b) 50-100 g/L of H_2SO_4;

c) 30-150 ppm of Cl^-

d) a brightener;

e) a wetting agent; and

f) water, and

(2) providing electroplating power between said conductive layer and an anode disposed in electrical contact with said bath

(g) removing the masking layer; and

(h) removing at least portions of the barrier layer and conductive layer exposed by the removal of the masking layer.

42. The process of Claim 41, wherein the copper is electroplated onto the conductive layer at a rate of at least 4 μm/min.

43. The process of Claim 41, wherein the bath further comprises a leveler.